■ENGINE CONTROL SYSTEM

1. General

The engine control system of the 2GR-FE engine has the following features.

System	Outline
SFI (Sequential Multiport Fuel Injection)	● An L-type SFI system directly detects the intake air mass with a hot wire type air flow meter. ● The fuel injection system is a sequential multiport fuel injection system. ● Fuel injection takes two forms: Synchronous injection, which always takes place with the same timing in accordance with the basic injection duration and an additional correction based on the signals provided by the sensors.Non-synchronous injection, which takes place at the time an injection request based on the signals provided by the sensors is detected, regardless of the crankshaft position. ● Synchronous injection is further divided into group injection during a cold start, and independent injection after the engine is started.
ESA (Electronic Spark Advance)	● Ignition timing is determined by the ECM based on signals from various sensors. The ECM corrects ignition timing in response to engine knocking. ● This system selects the optimal ignition timing in accordance with the signals received from the sensors and sends the (IGT) ignition signal to the igniter.
ETCS-i (Electronic Throttle Control System-intelligent) [See page EG-55]	Optimally controls the throttle valve opening in accordance with the amount of accelerator pedal effort and the condition of the engine and the vehicle.
Dual VVT-i System (Dual Variable Valve Timing-intelligent System) [See page EG-57]	Controls the intake and exhaust camshafts to an optimal valve timing in accordance with the engine condition.
ACIS (Acoustic Control Induction System) [See page EG-63]	The intake air passages are switched according to the engine speed and throttle valve opening angle to provided high performance in all speed ranges.
Air Intake Control System [See page EG-65]	The intake air duct is divided into two areas, and the ECM controls the air intake control valve and the actuator that are provided in one of the areas to reduce the amount of engine noise.
Fuel Pump Control [See page EG-66]	● Fuel pump operation is controlled by signals from the ECM. ● The fuel pump is stopped, when the SRS airbag is deployed in a frontal, side, and rear of side collision.
Air Conditioner Cut-off Control	By turning the air conditioning compressor ON or OFF in accordance with the engine condition, drivability is maintained.
Cooling Fan Control [See page EG-67]	The cooling fan ECU steplessly controls the speed of the fans in accordance with the engine coolant temperature, vehicle speed, engine speed, and air conditioning operating conditions. As a result, the cooling performance is improved.
Starter Control (Cranking Hold Function) [See page EG-69]	Once the engine switch is pushed, while the brake pedal is depressed, this control continues to operate the starter until the engine started.

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System	Outline
Air Fuel Ratio Sensor and Oxygen Sensor Heater Control	Maintains the temperature of the air fuel ratio sensor or oxygen sensor at an appropriate level to increase accuracy of detection of the oxygen concentration in the exhaust gas.
Evaporative Emission Control [See page EG-71]	● The ECM controls the purge flow of evaporative emission (HC) in the charcoal canister in accordance with engine conditions. ● Approximately five hours after the engine switch has been turned OFF, the ECM operates the pump module to detect any evaporative emission leakage occurring between the fuel tank and the charcoal canister through changes in the fuel tank pressure.
Active Control Engine Mount [See page EG-35]	The damping characteristic of the front engine mount is controlled variably to reduce idling vibration.
Engine Immobilizer	Prohibits fuel delivery and ignition if an attempt is made to start the engine with an invalid key.
Diagnosis [See page EG-83]	When the ECM detects a malfunction, the ECM diagnoses and memorizes the failed section.
Fail-Safe [See page EG-84]	When the ECM detects a malfunction, the ECM stops or controls the engine according to the data already stored in the memory.